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The two principal accomplishments during this period have been the successful extension of the dimensional overlap model to sequential effects, and the completion of Greg Stevens' dissertation. The sequential effects on which we have been focusing are the speed ups and slow downs of RT with repetitions and non-repetitions, respectively, of stimuli and/or responses in choice RT tasks - the so-called repetition effect. Of particular importance for the dimensional overlap model is the finding that the repetition effect interacts with S-R compatibility. We have now shown that the DO model can account for this interaction, as well as for the repetition effects of irrelevant stimuli, by postulating that the information requirements on repeated trials are less than on non repeated trials.

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OCTOBER 1, 1999 – SEPTEMBER 30, 2000

FOUNDATIONS OF STIMULUS-RESPONSE/ STIMULUS-STIMULUS COMPATIBILITY

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3 & 4 SUMMARY

This was the final year of the grant.

The two principal accomplishments during this period have been the successful extension of the dimensional overlap model to sequential effects, and the completion of Greg Stevens' dissertation. The sequential effects on which we have been focusing are the speed ups and slow downs of RT with repetitions and non-repetitions, respectively, of stimuli and/or responses in choice RT tasks - the so-called repetition effect. Of particular importance for the dimensional overlap model is the finding that the repetition effect interacts with S-R compatibility. We have now shown that the DO model can account for this interaction, as well as for the repetition effects of irrelevant stimuli, by postulating that the information requirements on repeated trials are less than on non repeated trials. We call this the "Information Reduction Hypothesis". Basically, when the relevant stimuli overlap, the repetition effects are accounted for by a reduction in either the stimulus and/or the response thresholds. When the irrelevant stimuli overlap, the repetition effects are accounted for by a reduction in the time needed to distinguish between relevant and irrelevant stimuli. Thus, depending on whether the relevant or irrelevant stimulus dimension has DO, one or the other of two parameters in the DO model is modified, contingent on the occurrence of a repetition. Simulations, based on this implementation of the hypothesis in the DO model, fit the experimental results well (Kornblum & Stevens, in press). In his dissertation Stevens shows that the S-S consistency effect in flanker tasks actually consists of two effects: one on the response stage, the other on the stimulus stage (Stevens 2000). In a further development of the DO model we have also shown that irrelevant response dimensions have a profound effect on performance depending on which aspect of the task they overlap with (Stevens & Kornblum, 2000). This is being pursued further by Stevens who started a post-doc with John Hummel at UCLA this fall.

5. PERSONNEL SUPPORTED

Principal Investigator

Sylvan Kornblum – 40%

Graduate Student

Gregory Stevens – supported in part by a DoD Predoctoral Fellowship and a Rackham Predoctoral Fellowship.

Staff

Anthony Whipple, software/computer engineer – 100%

James Morgenstern, programmer – 5%

Others

Hourly assistants – approximately 30 hours per week.

6 & 7. PUBLICATIONS

1. Shiu, L-P, and Kornblum, S. (1999). Stimulus-Response compatibility effects in go/no-go tasks: A dimensional overlap account. *Perception and Psychophysics*, 61, 1613-1623.

2 Stevens, G. T. (2000). The locus of Eriksen, Simon, and Stroop effects: New data and a comparison of models. A PhD dissertation submitted at the University of Michigan, Ann Arbor, MI.

In press

1. Kornblum, S. & Stevens, G.T. Intertrial sequential effects of dimensional overlap: Findings and issues. The Association Lecture. In, *Attention & Performance XIX: Common Mechanisms in Perception and Action,* W. Prinz & B. Hommel, (eds). Oxford University Press.

Presentations

1. Kornblum, S. (2000). S-R and S-S compatibility and Dimensional Overlap. AFOSR Forum on Human Attentional Processes, 25-26 May, 2000, Fairborn OH.

2. Stevens, G.T. & Kornblum, S. (2000). Goals and dimensional overlap: The effects of irrelevant response dimensions. *A poster presented at the XIXth. International Symposium on Attention & Performance*. Kloster Irsee, Germany, July 16-22, 2000

[3. Kornblum, S. *(2001).* The Dimensional Overlap model of S-R and S-S compatibility. Invited Plenary Lecture - Third International Conference on Cognitive Science, August 27-31, Beijing, China.]

In preparation

1. Stevens, G. T. & Kornblum, S. The locus of consistency effects in Eriksen and Stroop-like tasks.

2. Kornblum, S. & Stevens, G. T. Representation and processing in Hedge & Marsh tasks.